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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,721	02/14/2002	Antoine Berthet	28944/38252	1625
8968	7590	06/01/2005	EXAMINER	
GARDNER CARTON & DOUGLAS LLP			TRAN, KHANH C	
ATTN: PATENT DOCKET DEPT.				
191 N. WACKER DRIVE, SUITE 3700			ART UNIT	
CHICAGO, IL 60606			PAPER NUMBER	
			2631	

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/075,721	<b>Applicant(s)</b> BERTHET ET AL.	
	<b>Examiner</b> Khanh Tran	<b>Art Unit</b> 2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 February 2002.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☒ Claim(s) 11 and 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>07/22/2002</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 2-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 2-4, the transitional phrase "consists" recited in line 3 of claim 1 on which claims 2-4 depend, renders the claim indefinite because the transitional phrase "consists" excludes any element, step, or ingredient not specified in claim 1. See MPEP § 2111.03.

2. Claims 6-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 6-7, the transitional phrase "consists" recited in line 23 of claim 5 on which claims 6-7 depend, renders the claim indefinite because the transitional phrase "consists" excludes any element, step, or ingredient not specified in claim 5. See MPEP § 2111.03.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-4, 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bevan et al. U.S. Patent 6,891,897.

Regarding claim 1, Bevan et al. invention is directed to a space-time coding apparatus having an input, trellis encoder, modulator, a demultiplexer, and a set of signal outputs wherein the input is operable to receive a stream of data. In column 18, lines 15-65, figures 5(iv) and 9 discloses a serial concatenated Space-Time Trellis Coding (STTC) transmitter includes:

A binary convolutional coder for subjecting information bits to an outer coding to generate coded bit stream having certain rate

Bit interleaver for generating interleaving bit stream; Bevan et al. does not teach the interleaver performing blockwise interleaving process. Nevertheless, blockwise interleaving is well known in the art. In one embodiment, column 13, lines 35-50, the convolutional coder can be a quarter rate coder whereby four information bits generate sixteen coded bits, which provide eight QPSK symbols to provide two space-time symbols for each input data block. In light of Bevan et

al. suggestion, because the convolutional coder provides plurality of symbols, it would have been obvious for one of ordinary skill in the art at the time of the invention that the transmitter in figure 9 can be modified to employ a block interleaver instead. For block interleaving, data stream is subdivided into successive blocks as appreciated by one of ordinary skill in the art.

Bevan et al. does not show the step of demultiplexing coded and interleaved digital stream as set forth in the application claim. However, in column 11, lines 40-65, figure 5(iii) discloses. The value of the last test group of information bits is used to determine the transitions that will occur between present state and next state. The result of the this transition is the transmission of what is known as space time symbol, which is actually equivalent to the simultaneous transmission of a group of symbols; one from each of the transmit antennas. In light of the foregoing teachings, because each of the transmit antennas transmit each space time symbol, the STTC encoder performs the step of demultiplexing the coded and interleaved digital stream.

In column 18, lines 3-16, Bevan et al. further teaches that an alternative approach to obtaining a code with a large number of states is to serially concatenate a pair of low-complexity trellis codes. It is important to interpose the inner and outer coders with an interleaver of large span. In view of that, STTC encoder in figures 5(iii) and 9 performs equivalent encoding of each interleaved coded digital data stream as claimed.

As recited above, a plurality of transmit antennas is employed to transmit space-time symbol.

Regarding claim 2, the second code for the inner coder is user input. Hence, the second code is unique code of specified rate.

Regarding claim 3, claim 3 is rejected on the same ground as for claim 2 because of similar scope. Furthermore, because the distinct code of specified rate applies to every interleaved coded digital data streams, the distinct code applies to one of the interleaved coded digital data streams.

Regarding claim 4, figures 5(iii) and 9 discloses a space-time Trellis Coding encoder with a plurality of antennas. In view of that, inner coding includes a code of the spatio-temporal trellis coded modulation type.

Regarding claim 8, claim 8 is rejected on the same ground as for claim 1 because of similar scope.

Regarding claim 9, claim 9 is rejected on the same ground as for claim 4 because of similar scope.

4. Claims 5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bevan et al. U.S. Patent 6,891,897 B1 as applied to claim 1 above, and admitted prior art on pages 5-6 of the original disclosure.

Regarding claim 5, claim 1 discusses the preamble of claim 5 and is rejected above. The rejection of claim 1 also applies here. Furthermore, referring to figure 9, Bevan et al. teaches a serial concatenated STTC decoder including:

A SISO decoder for receiving transmit space-time symbols (STS) and jointly decoding the transmit space-time symbols. Bevan et al. does not teach the number of receiving antennas equal to the number of transmit antennas. Hence, Bevan et al. teachings apply to both cases, e.g. same number of antennas or number of antennas independent from each other;

The receiving data streams being subjected to an iterative process of jointly decoding. The STTC decoder (figure 9) generating a first Extrinsic STS information stream on the bits coded by the first outer code and interleaved constituting an a priori information item. Bevan et al. does not teach the step of equalization of transmission channel at the receiving side. Admitted prior art on page 6 of the original disclosure discusses a similar serially concatenated spatio-temporal trellis coded modulation in which it is essential advantage consisting in allowing joint equalization and inner spatio-temporal decoding by virtue of sub-optimal SISO algorithms of reduced complexity. Bevan et al. and admitted prior art teach in the same view of endeavor. Admitted prior art discusses the essential advantage of joint equalization and decoding. In view of that, it would have been obvious for one of ordinary skill in the art at the time of the invention

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that Bevan et al. SC-STTC in figure 9 decoder can be modified to include the step of equalization. Such step is an essential advantage for spatio-temporal temporal trellis coded modulation.

A bit deinterleaver (in figure 9) for generating a second extrinsic information as claimed;

A SISO decoder (for binary convolutional) for generating extrinsic CS probabilities, corresponding to the claimed third extrinsic;

extrinsic CS probabilities being subjected to a bit interleaver for generating extrinsic information stream;

reinjecting the extrinsic information stream into the iterative process for equalization of the transmission channel and joint decoding.

Regarding claim 10, claim 10 is rejected on the same ground as for claim 5 because of similar scope.

### ***Allowable Subject Matter***

5. Claims 11-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.



***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mansour et al. U.S. Patent 6,353,637 B1 discloses "Multistream In-Band On-Channel Systems".

Seshadri et al. U.S. Patent 6,584,593 B1 discloses "Concatenation Of Turbo-TCM With Space-Block Coding".

Balachandran et al. U.S. Patent 6,483,828 B1 discloses "System and Method For Coding In A Telecommunications Environment Using Orthogonal And Near-Orthogonal Codes".

Fukumasa U.S. Patent Publication No. 2003/0005388 A1 discloses "Concatenation Convolutional Code Decoder".

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 571-272-3007. The examiner can normally be reached on Monday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KCT

*Khanh Cong Tran*

*05/27/2005*

Examiner KHANH TRAN